HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Nisqually Hatchery at Clear Creek
Species or Hatchery Stock:	Coho
Agency/Operator:	Nisqually Indian Tribe
Watershed and Region:	Nisqually River, WRIA 11, Puget Sound
Date Submitted:	March 27, 2003
Date Last Updated:	March 27, 2003

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.
Nisqually Hatchery at Clear Creek

1.2) Species and population (or stock) under propagation, and ESA status.
Coho Salmon (Oncorhynchus kisutch), Hatchery stock (Unlisted).

1.3) Responsible organization and individuals
Indicate lead contact and on-site operations staff lead.
Name (and title):) Bill St. Jean (Chief Enhancement Biologist)
Agency or Tribe: Nisqually Indian Tribe
Address: 12501 Yelm Highway SE, Olympia, WA 98513
Telephone: 360-664-3772
Fax: 360-664-3746
Email: NA

Name (and title: David Troutt (Director of Natural Resources)
Agency or Tribe: Nisqually Indian Tribe
Address: 12501 Yelm Highway SE, Olympia, WA 98513
Telephone: 360-438-8687
Fax: 360-438-8742
Email: dtroutt@nwifc.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program: NA

1.4) Funding source, staffing level, and annual hatchery program operational costs.
Nisqually Tribal funds is the funding source for this program with an annual O&M budget of over $600,000. Staffing level is 6.6 FTE's.

1.5) **Location(s) of hatchery and associated facilities**.
Clear Creek (WRIA 11.0013C) is a right bank tributary located at RM 6.3 on the Nisqually River, Puget Sound, Washington. The facility is located at RM 0.2 of Clear Creek.

1.6) Type of program.
Isolated Harvest

1.7) Purpose (Goal) of program.
The purpose of this program is to provide for treaty reserved fishing opportunity for the Nisqually Tribe and other treaty and non-treaty Puget Sound fisheries.

1.8) Justification for the program

The Nisqually Tribe has established a goal of providing an annual in-river treaty harvest of 15,000 – 20,000 coho salmon. In order to meet this goal, the Tribe has developed substantial artificial production programs at this facility and its Kalama Creek hatchery.

Past artificial production, loss of critical fresh water and marine habitat and harvest management practices have had serious impacts on the viability of the natural coho salmon in the Nisqually River. Since the 1940's, southern Puget Sound Coho have experienced harvest rates directed at major artificial production facilities these levels were too high to sustain natural production. Hatchery fish from at least seven different brood stocks have been released or outplanted from Nisqually River and other Puget Sound facilities since at least 1943. Between 1943 and 1981 over 14 million Coho were released throughout the watershed with an average annual release of over 360,000 fish. From 1982 through 1995 hatchery coho out planting and releases into the Nisqually River totaled over 27 million fish with an average yearly release of over 1.9 million fish. Coho have been released in at least 13 different tributaries and the mainstem Nisqually. Fisheries in the Nisqually River, as well as the rest of southern Puget Sound, have been managed solely for hatchery escapement needs and routinely subject coho stocks to harvest rates in excess of those appropriate for natural stocks.

The artificial production program described here will be operated using risk reduction actions that are designed to control potential negative ecological interactions while providing for a meaningful treaty and non-treaty harvest. Specific actions will include reduction of ecological risks by maintaining spatial separation from listed natural stocks as well as actions to reduce predation on those stocks. Specific actions in these areas will be discussed in further detail in the appropriate sections of this hatchery and genetic management plan. (HGMP)

1.9) **List of program "Performance Standards".**

Goal	Performance Standards	Performance Indicator
Produce fish to meet harvest needs	Hatchery production provides adult returns to terminal areas to meet Tribal treaty and non-tribal harvest rights and provide escapement to hatchery rack as defined in Management Plan	Treaty harvest in in-river fishery is on average between 15-20,000 adult coho.
	Fishery management provides for harvest needs and meets escapement goals for natural and hatchery returns	A average of 1,000 adults return to hatchery rack annually for brood stock
		Estimated natural escapement spawners on average reaches objective of 4000 adults
	Rearing practices maximize survival from egg to release	The rate of fertilization and survival from egg to smolt provides for production goal of 630,000 yearling smolts
Maintain genetic diversity of hatchery stock	Maintain large effective population size	Number of hatchery spawners maintained at a average of 1,000
	Follow spawning protocol to increase effective population size	Utilize modified 6*6 factorial spawning protocol
	Minimize changes in migratory behavior of hatchery stock	Brood stock collected through-out range of migration to the rack, from mid September to early December
Control potential negative genetic impacts on natural spawners	Reduce potential straying of hatchery production by: • Utilizing Minter or Soos Creek origin Nisqually hatchery returns. • Location of facility on a separate tributary in lower mainstem, with distinct water source.	Due to coho currently not being mass marked there is no way to identify Hatchery strays. It is our intention to begin mass marking with BY 2002.
Control potential negative ecological impacts on naturally produced juveniles	Minimize impacts of juvenile hatchery releases on naturally produced juveniles	Hatchery smolt size is maintained at minimum of 19 fish per pound to maximize probability of immediate out migration
		Hatchery smolts volitionally released below RM 6.3 to minimize interaction with natural out migrating smolts
		On station releases only, no tributary supplementation.

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."
See table in section 1.9

1.11) Expected size of program.
630,000 yearlings annually

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). The average annual broodstock needs for this program will be 1000 adults. These fish will be derived from importation of south sound stocks or hatchery returns of south sound stocks and will not require the mining of natural stocks. The average escapement to this facility from return years 1992 through 2001 has been 1559 adults per year. During this period, escapements have ranged from a low of 156 adults in 1999 to a high of 4,108 adults in 1996. Annual escapement to the facility has been as follows:

Return Yr	# Males	# Females	Jacks
1992	370	528	595
1993	626	781	575
1994	1174	1598	466
1995	654	946	1006
1996	2126	1982	573
1997	595	596	324
1998 *	293	272	101
1999 **	92	64	22
2000 *	455	450	139
2001	964	1,030	33
2002 ***	1	2	

* Changed to Minter Creek stock no eggs taken
** No eggs available from Minter Creek no fish reared
*** Minter eggs positive for VHS replaced with Soos Creek eggs

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs	N/A	N/A
Unfed Fry	N/A	N/A
Fry	N/A	N/A
Fingerling	N/A	N/A
Yearling	On-Station, R.M. 6.3 Nisqually R.	630,000 yearlings

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.
This program has been in operation since 1991, therefore results are only available for brood years 1990 through 1996. 1997 – 2001 results will be added with an updated HGMP in the near future. Survival rates include total estimated recoveries in fisheries and escapement.

Smolt-to Adult Survival Rates:

Brood Year	Est. Min. Total Survival Rate (%)	Est.Survival to Nisqually R.(%)
1990	0.79	0.29
1991	1.43	0.59
1992	0.54	0.19
1993	0.97	0.51
1994	0.24	0.10
1995	0.42	0.34
1996	0.05	0.027

Program goals are to achieve 1.8% to 2.3% adult survival to the Nisqually River.

Adult Production Levels:

Brood Year	Estimated Adult Production (Including jacks)
1990	3,665
1991	5,264
1992	2,334
1993	5,548
1994	1,388
1995	1,040
1996	171

The program goal for a release of 630,000 yearlings is to achieve adult production levels to the Nisqually River of between 12,000 and 15,000 fish.

Estimated Escapement Contribution (Including Jacks):

Brood Year	Estimated Escapement Contribution Hatchery and Natural
1989	3,493
1990	3,992
1991	10,038
1992	8,706
1993	5,281
1994	7,696
1995	1,866
1996	678

Escapement needs for the program of 630,000 yearlings will require an average of 1,000 adults.

(All figures reported in Section 1.12 are derived from CRAS coded wire tag recovery reports for brood years 1989 – 1996 and Hatchery Rack counts)

1.13 Date program started (years in operation), or is expected to start.

Program began with fish releases in 1991 (Brood year 1989).

1.14 Expected duration of program.

This program is under review by the Tribe and being evaluated and changes are being made in regard to hatchery techniques. These changes include delayed incubation using a chiller for a more normal timed emergence. The use of "semi-natural rearing" techniques as well as utilizing a locally adapted South Sound stock may have a better chances of adapting to the system. These changes are in conjunction with the multi-species recovery plan being developed by WDFW and the Nisqually Tribe. The current goal of the program is to contribute to meeting the Nisqually Tribe's goal of providing an annual in-river harvest of 15,000 - 20,000 coho. This artificial production program is being assessed on a yearly basis.

1.15) Watersheds targeted by program.

Nisqually River, WRIA 11, Puget Sound

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The Tribe has attempted to reach this goal by several different approaches, including no on-station artificial production (out planting of hatchery fish from other Puget Sound watersheds), artificial production from the Kalama Creek hatchery along with out planting, and finally, operation of Kalama Creek along with the development of this program. The current approach of on-station production of coho smolts has the lowest potential for negative ecological interactions, and should have the highest likelihood to meet the tribal fishery goals. We have made changes in the culturing techniques in this program and we are using some aspects of semi-natural rearing by installing cover and structures within the raceways and large rearing pond. We are delaying egg development by the use of a water chiller to produce a more normal time emergence. We are also attempting to control growth to produce a more natural growth curve in nearly constant 51 degree F. temperatures water. These efforts and the use of a local South Sound stock should help this program to meet it's goals.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

Tribe has submitted HGMP's consistent with the tribal 4d exemption criteria and they are being reviewed.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

No known take of listed fish in this hatchery program.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Much of this requested information is available for the composite Nisqually River chinook stock, but due to the current inability to distinguish all hatchery origin fish from naturally produced fish, (mass marking started in BY 2000) it is impossible to describe these population characteristics for the listed stock at this time. Despite this limitation, information about the distribution of adult chinook spawners is provided below.

<u>Distribution and Timing of Naturally Spawning Fall Chinook</u>
Fall chinook spawn throughout the main stem from approximately RM 15 to approximately RM 40, as well as in the major tributaries of the Nisqually River including the Mashel River, and Ohop and Yelm Creeks. Total escapement estimates are generated by expansion of peak counts from index areas on the mainstem and the Mashel River. An accurate estimation of spawning distribution of fall chinook is nearly impossible in the mainstem due to extremely poor visibility from glacial runoff during the fall and early winter, however, the information that we have indicate that a major proportion of the spawning occurs in the mainstem, between RM 21.8 and RM 26.2.

Spawning occurs between mid-September and early November, with peak spawning generally occurring the first or second week of October.

- **Identify the ESA-listed population(s) that will be <u>directly</u> affected by the program.**
  No ESA-listed population is directly used in this program.

- **Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.**
  Some natural origin Nisqually River fall chinook may voluntarily exit the Nisqually River into Clear Creek and be captured during the collection of coho brood stock. This number is believed to be extremely low due to the location of the brood stock collection area, the water chemistry of the facility, and the flow of the hatchery creek in comparison to the mainstem Nisqually River. The adult collection facility is located approximately 0.2 miles upstream on Clear Creek, a tributary to the Nisqually River. The hatchery water source is well or spring fed in origin and flows through a large supply forebay on the hatchery site. It is believed to differ in water chemistry from the glacially influenced main stem. The hatchery creek flow during adult chinook migration is also significantly lower than the flow in the main stem, approximately 20 cubic feet per second compared to approximately 900 cubic feet per second. This difference as well would make it unlikely for a listed stock to be captured during the collection of coho brood stock.

Listed fall chinook juveniles may also be incidentally affected through the release of juvenile coho for this program. Potential negative ecological and genetic impacts from these releases will be minimized by providing temporal and spatial separation from program fish. Methods to minimize these interactions are described in other sections of this HGMP.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- **Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.**
  The status of the composite Nisqually River fall chinook population would be considered to be above the viable population threshold. The average escapement estimate for this composite stock from 1988 – 1999 has been 1092 fish. The actual composition of the stock is believed to be hatchery origin (Green River). Escapement estimates for 1988 – 1994 were likely highly influenced by returning hatchery fish from the Schorno Springs facility spawning in the main stem river. This facility, closed in 1992 in favor of on-station releases at Clear Creek, was a release site only, and returning adults would not have been segregated from natural origin chinook.

- **Provide the most recent 12-year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**
  Mass marked fish are beginning to return in significant numbers so information will become available in future years.

Provide the most recent 12- year annual spawning abundance estimates, or any Other abundance information. Indicate the source of this data.
Hatchery Rack is Adults only from Hatchery records.
Natural escapement estimates and Tribal catch are from Nisqually Tribal spawning ground estimates and fish tickets.

Return Year	Hatchery Rack	Nat. Escapement	Tribal Catch
1990	12	700	4,278
1991	629	215	419
1992	401	106	301
1993	1,607	2,104	4,024
1994	1,826	3,623	6,183
1995	2,853	817	7,171
1996	2,894	606	5,365
1997	11,123	340	4,309
1998	3,759	834	7,990
1999	11,132	1,399	14,614
2000	3,685	1,253	6,836
2001	7,094	1,079	14,098
2002	8,007	1,542	11,703

Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.
The premise of the Nisqually River Chinook recovery plan is that NOR's are of hatchery (Green River) origin given the long history of releases of chinook into the Nisqually river. This was verified with a genetic study conducted in 2000 and 2001. With the return of marked fish last year 2002 a pilot study was started to determine the change in ratio (clip vs. unclipped) in the fishery at the hatcheries and in a test fishery above the hatcheries. This study was funded with Hatchery Reform funds to determine the stray rate of hatchery fish onto the spawning grounds.

Describe hatchery activities including associated monitoring that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.
None of the categories in the take table apply to this program. Since there is, however, a chance that a naturally produced fall chinook could voluntarily swim into the adult collection facility, brood stock collection directed at hatchery coho has a "low" potential to take listed fall chinook salmon. If straying of natural fish into the facility does occur, it is doubtful that this number is significant. The estuary study as described in Section 12 has take of listed stock this take is accounted for under tribal research submitted by NWIFC as part of the 4d exemption.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
No plan exists at this time.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).
Take of natural origin fall chinook adults was accounted for in the fall chinook HGMP for this facility.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
No plan currently exists.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

No ESU-wide plan exists for coho at this time.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

This program operates under and is consistent with several court orders and agreements. These include U.S. v. Washington, and subsequent orders including the Puget Sound Salmon Management Plan, the Nisqually River Management Plan, and a memorandum of agreement on the operation of this facility between the Nisqually Indian Tribe and the US Fish and Wildlife Service.

3.3) Relationship to harvest objectives.

The Nisqually River fall coho population has been managed as a composite stock (hatchery + natural), with the primary harvest objective of providing the required escapement for hatchery production as well as achieving a natural escapement of 4000 fish. To accomplish this the Nisqually Tribe is currently evaluating Minter Creek and Soos Creek as a brood source for the Nisqually River and making changes in fish culture regimes within the program aimed at meeting this objective. Additionally, the multi-species plan currently being developed by the Tribe will help direct the future coho program.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Fisheries benefiting from this program include Canadian fisheries (sport, net, and troll), Washington fisheries including pre-terminal treaty and non-treaty fisheries, and terminal treaty harvest primarily by the Nisqually Indian Tribe in the Nisqually River. Estimated harvest levels by fishery are provided below. An estimate of future harvest rates on the listed stock is provided in 3.3 above. For further details see attached CRAS coded wire tag recovery distribution reports.

Fishery	BY 1990	BY 1991	BY 1992	BY 1993	BY 1994	BY 1995	BY 1996
B.C.	1820	2427	992	1978	321	0	0
Wash. (General)	654	841	486	786	546	251	66
Treaty Terminal	297	364	29	0	0	2	13
Total	2771	3632	1507	2764	867	253	79

3.4) Relationship to habitat protection and recovery strategies.

The Nisqually Tribe has developed an extensive habitat protection and restoration framework and action plan focusing on factors that will provide benefits for listed fall chinook as well as other salmon species. Selective habitat restoration projects in the Nisqually River estuary, main stem, and tributaries, along with protection of existing condition elsewhere are projected to provide significant improvement for all naturally produced salmon an in the Nisqually River. The complete habitat action work plan for the Nisqually basin can be found in the Nisqually River Fall chinook Recovery Plan.

3.5) Ecological interactions.

In order to keep the response to a reasonable length, the discussion here will generally be limited to interactions between the program fish and listed species. Some discussion of interaction with other salmonid species will be provided.

Predation – Program coho salmon may prey on listed Nisqually River fall chinook during several life stages in the freshwater, estuarine, and marine environment. In addition, the offspring of program coho that may reproduce in the wild may also prey on the listed stock. The magnitude of predation on naturally produced chinook by hatchery produced coho, is unknown. The answer to this question may be determined in the Tribes ongoing study in the lower river and estuary (see section 12).
The Special Interaction Workgroup (SIWG) formed under the Salmon and Steelhead Conservation and Enhancement Act of 1980 categorized this risk as unknown during freshwater and estuarine life stages, primarily since there was little documentation of these interactions. Actions can be taken to minimize the risk of predation, including the type of fish that are released and when, and how the fish are released. In the case of the program fish, all are volitionally released in the lower 6.3 miles of the Nisqually River as actively migrating smolts thus reducing duration of overlaps in time and space. The risk of freshwater and early marine predation by program fish is categorized as unknown for interactions with steelhead and coho salmon, and high for pink and chum salmon (SIWG). Actions to minimize the risk of predation to these species are the same as described for interactions with the listed stock.

Competition – Program coho salmon may compete with listed Nisqually River fall chinook for food and space in the freshwater, estuarine, and marine environment.
The answer to this question may be determined in the tribes ongoing study in the lower river and estuary (see section 12). The risk of competition is categorized by the SIWG as high in freshwater and unknown in early marine life. The release of non-migratory coho is believed to pose the highest risk due to competition. To reduce the risk of this interaction with the listed stock, the program will volitionally release smolts in the lower 6.3 river miles to minimize the duration of this interaction.
The risk of freshwater competition by program fish is categorized as high for interactions with steelhead and coho salmon, and low for pink and chum salmon (SIWG). The risk of competition by program fish in early marine life stages is categorized as high for interactions with naturally produced coho and unknown for interactions with steelhead, pink and chum salmon. Actions to minimize the risk of competition with these species are the same as described for interactions with the listed stock.

Disease Transmission – Hatchery effluent has the potential to transport pathogens from the hatchery water supply to receiving water containing listed and other stocks. Pathogens may also be transmitted by direct contact of infected hatchery fish with other stocks. Although these methods of disease transmission are possible, there is little information showing that pathogens are transferred to naturally produced stocks. This program is operated under the disease prevention and detection guidelines established by the "Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State." These practices should minimize this risk for both listed and other stocks.

Effects of Hatchery Effluent – Hatchery effluent may alter various properties of the receiving water used by listed and other stocks. These properties include suspended solids, settleable solids, temperature, dissolved oxygen, biological oxygen demand, and nutrient. The Clear Creek program is operated under an NPDES permit with limitations set by the US Environmental Protection agency limiting the changes and effects of these properties on the receiving water. Adherence to these standards will minimize this risk for both listed and other stocks

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Clear Creek is a small independent tributary of the Nisqually River that originates from a series of springs on the Fort Lewis Military Reservation and enters the river at approximately RM 6.3. Access to approximately 0.5 miles of the stream is blocked to all adult fish by a sheet pile dam located approximately 0.2 miles upstream from the Nisqually River. Typically, spring flow varies on an annual cycle from approximately 3000 gallons per minute (gpm) in the late fall and early winter to over 12,000 gpm in the spring. There spring flows are susceptible to drought conditions.

The facility is also able to draw ground water totaling up to 7000 gpm from five production wells on site. Detailed chemical analysis of the hatchery water supply in comparison to the Nisqually River has not been done. The hatchery water supply, however, flows through two supply forebays with a high hydraulic retention time, causing the hatchery discharge to have water chemistry characteristics more typical of a lenthic environment than the glacially influenced Nisqually River.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

As indicated in 4.1., the hatchery is located on an independent tributary of the Nisqually River. Use by fall chinook is thought to be limited to adults returning from the hatchery program. All intakes are screened and located above an impassable sheet pile dam that forms the lower supply forebay for hatchery rearing ponds. A low risk exists that a listed naturally produced chinook may voluntarily turn into Clear Creek, swim 0.2 miles to the hatchery pond, and be incorporated into the chinook brood stock. This is minimized by the presumed chemical difference between the hatchery water supply and the glacial main stem Nisqually. Clear Creek's flow during fall chinook returns of approximately 12 cubic feet per second (cfs) in comparison to main -stem flow of 750 – 900 cfs, also provides little attraction flow for naturally produced chinook.

Risk of take of listed fish from effluent discharge will be minimized by compliance with the discharge limitation set by the NPDES permit for this station.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Brood stock is collected and held in a 50,000 cubic foot adult capture pond supplied with approximately 4000 gpm of water through three upwell supplies. The pond can be segregated into two large sections and a small center section by the use of wooden pickets. No brood stock is collected in the Nisqually River. All brood stock captured must voluntarily turn out of the main stem Nisqually and traverse the creek and fish ladder to be captured.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

No transportation equipment is necessary for this program.

5.3) Broodstock holding and spawning facilities.

See 5.1 above for brood stock holding facility. Spawning takes place at the adult capture pond in a covered spawning area. All gametes are chilled after collection and transported one-half mile to the hatchery facility for fertilization.

5.4) Incubation facilities.

The incubation room contains 224 8-tray stacks of vertical incubators (1792 total trays) and 8 Sims trough incubators. Vertical incubators are supplied with 4 gpm of flow for each 8-tray stack.

Sims trough incubators are used for eyeing only and are each supplied with 12 gpm of flow. Incubation water in the Sims trough is chilled using a gravity flow chiller system to lower the water temp. from 52 – 45 degree's F. Incubation water is supplied from four separate springs and/or two separate well supplies. Water supply to the distribution tower and the incubation room is protected with alarms linked to an alarm panel and auto dialer system. A 350-kilowatt backup generator with automatic transfer equipment supplies emergency power to the entire upper site, and is also linked to the alarm notification system.

5.5) Rearing facilities.

Clear Creek is divided into two separate sites in order to maximize the available water supply. The upper site consists of a hatchery building, ten raceways, and one 50,000 cubic foot asphalt rearing pond. Water is supplied to the ponds from four spring sources and up to four production well supplies. The production wells at this site can provide up to 5500 gpm of ground water when necessary. Additional water can be supplied to the raceways and rearing pond from the forebay created by the upper Clear Creek sheet pile dam. The ponds at the upper site provide a total of 75,000 cubic feet of rearing space. Each of the ten raceways is 10 feet wide and 100 feet long with an average water depth of 2.5 feet, providing 2500 cubic feet of rearing space each. Each raceway is designed to used between 350 and 450 gpm of water. The large rearing pond at this site provides 50,000 cubic feet of rearing space and is designed to use 5000 gpm of water.

The lower site consists of four large rearing ponds located to take advantage of increased water flow from the lower forebay, an additional spring water supply, and an additional production well. All or part of the water supplied to the upper site can be reconditioned through the lower forebay and reused at this site as well. Two rearing ponds at this site provide 40,000 cubic feet of rearing space each, and use 3000 – 4000 gpm of water each. Another pond is a combination, adult capture pond and juvenile rearing pond providing 50,000 cubic feet of rearing space. It is designed to use 4000 gpm of water. The fourth pond at this site, provides 25,000 cubic feet of rearing space and uses 2200 – 2500 gpm of water provided directly from a spring intake or well supply providing 1500 gpm. This site has a 60 kw backup generator with an automatic transfer switch and supplies emergency power for the entire site.

5.6) Acclimation/release facilities.

No separate off-station acclimation/release sites currently exist.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

In twelve years of operation, only two significant fish loss has occurred at this facility. In February 1996, a record flood inundated the lower hatchery site only two days after chinook fry were moved there for rearing. Of the 900,000 fish located there, an estimated 750,000 fry were swept out of the pond. Despite this loss, the program objectives were met during an event that caused extensive damage to other programs and facilities. This risk of flooding is greatly reduced for coho since they are held at the upper site for the entire rearing cycle.

In Dec. 2002 a fish kill occurred as a result of water inadvertently being diverted away from the coho pond. Resulting in a loss of 117,000 or 18% of the 2001 BY coho population. Plans are underway to improve the alarm system to prevent this type of problem in the future.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality. This program does not directly take listed fish for brood stock, but risk aversion measures for the hatchery program are described below.

Many of the back-up systems have been described above. In addition to those, all rearing ponds have level alarms linked through an alarm panel to an autodialed system. Although the hatchery is not staffed 24 hours a day, the combination of gravity flow available through the spring water supply, the alarm notification and the proximity of hatchery staff to the facility help prevent fish mortality.

Adult fish are screened for pathogens in accordance with the guidelines of the "Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State", and routine fish health monitoring exams are conducted on a monthly basis by staff from the Northwest Indian Fisheries Commission.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Brood stock for this program originally came from the WDFW Skykomish River facility or from fish returning to the station (unlisted stocks). Because of poor survival of program fish, a decision was made to attempt to develop a local brood stock from south Puget Sound hatchery sources (unlisted stocks) beginning with brood year 1998. A list of stocks used by brood year is shown below.

Brood Year(s)	Stock
1989 – 1990	Skykomish
1991	Skykomish (Yearlings), George Adams (Fingerlings)
1992 – 1993	Clear Creek
1994	Clear Creek, Kalama Creek
1995 – 1996	Clear Creek
1997	Clear Creek, Kalama Creek
1998	Minter Creek
1999	No South Sound Brood Stock Available
2000	Minter Creek

2001	Minter Creek Nisqually Return
2002	Soos Creek*

* Minter Creek eggs were taken, the brood tested positive for VHS. Eggs at Clear Creek were buried and replacement eggs were acquired from Soos Creek.

6.2) Supporting information.

6.2.1) History.

As stated in 6.1., the program stock was founded from the WDFW Skykomish River hatchery stock. Importation of that stock was discontinued after the 1991 brood year. Between brood years 1992 and 1997, the program used only Coho returning to the station or the Tribe's Kalama Creek hatchery (also Skykomish origin). Because of poor survival and contribution of fish from this program, in 1998, the co-managers agreed to eliminate the use of the Skykomish origin stock and replace it with coho from a southern Puget Sound source, preferably Minter Creek. In 1999, no eggs were available from Minter Creek for this program. In 2000 Minter Creek stock was also utilized. In 2001 Minter Creek (Nisqually return) fish were used for brood stock. In 2002 Soos Creek eggs were used see explanation at asterisk in section 6.1.

6.2.2) Annual size.

There is no way to determine the extent of incorporation of natural fish into the hatchery brood stock, due to a lack of identifiable mark. No natural spawning fish have been deliberately captured for this purpose. With the plan to mass mark Coho beginning with BY 2002 in the future we will be able to determine NoR's at the hatchery rack.

6.2.3) Past and proposed level of natural fish in broodstock.

See 6.2.2. above. No information is available regarding the annual number of natural fish incorporated in the brood stock.

6.2.4) Genetic or ecological differences.

This information is not currently known.

6.2.5) Reasons for choosing.

Choice of brood stock was based on stocks having the highest likelihood of similarities in genetic lineage and life history, as well being able to provide the number of eggs needed for production and a high likelihood of success in providing fishery benefits.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Brood stock selection practices for this program will have no effect on listed natural stocks.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

All adults and jacks returning to the brood stock pond.

7.2) **Collection or sampling design.**
Returning fish are captured at the hatchery pond located approximately 0.2 miles from the main stem Nisqually. The pond is operated between August and December and all returning adults are captured and sampled for Coded Wire Tags.

7.3) **Identity.**
We currently do not have the ability to identify the hatchery population from naturally produced coho populations but we will in the years to come.

7.4) **Proposed number to be collected:**
All hatchery returns will be collected

7.4.1) **Program goal (assuming 1:1 sex ratio for adults):**
Program needs are approximately 1000 fish.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs
1992	528	370	595	1,202,000
1993	781	626	575	1,011,000
1994	1,598	1,174	466	2,871,000
1995	946	654	1,006	1,377,000
1996	1,982	2,126	573	1,928,000
1997	596	595	324	397,600
1998	272	293	101	320,000
1999	64	92	22	No Eggs Taken
2000	450	455	139	No Eggs Taken
2001	1,030	964	33	1,150,000
2002	3	4	19	No Eggs Taken

7.5) **Disposition of hatchery-origin fish collected in surplus of brood stock needs.**
As stated previously, brood stock is collected from voluntary returns to the hatchery rack. No fish are passed upstream. When surplus brood stock is available, adults are selected for spawning at random in proportion to return timing. Surplus eggs are sold unfertilized to an egg buyer for edible row.

7.6) Fish transportation and holding methods.

No transportation of adults is required. Adult returns are held in a 50,000 cubic foot pond with approximately 4000 gpm of water supplied through an upwelling supply system. Adults are typically held for a short period, one to four weeks, and pre-spawning mortality is typically 5% or less. No prophylactic treatment of adults is necessary.

7.7) Describe fish health maintenance and sanitation procedures applied.

All returning adults are sampled in accordance with the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State." All eggs taken are disinfected in accordance with the policy prior to entering the main hatchery building. Eggs are also disinfected after sorting and prior to being put down to hatch.

7.8) Disposition of carcasses.

After gamete collection, hatchery carcasses are distributed to tribal members, food banks and the general public. The carcass plants into the watershed follow guidelines developed by the Co-Managers fish health staff to reduce the risk of transfer or amplification of pathogens in the watershed.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

No listed fish are collected for this program. Maintaining the adult collection facility on a tributary with a distinct water supply (in comparison to the Nisqually River main stem) will minimize the risk of adverse genetic or ecological effect to listed fish resulting from brood stock collection.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Sorting and spawning takes place from 1 to 2 times per week depending on the number of fish returning. All ripe females encountered each day are selected for spawning unless there are obvious indications of non-viable eggs or the presence of pathogens such as bacterial kidney disease. Fish are spawned throughout the entire run . When the number of returning adults far exceeds the program capacity of the facility, spawners are chosen randomly over the run.

8.2) Males.

Males are selected randomly on each spawning day. The number of males spawned is the total return (if less than the number of females), or a number equal to the number of females spawned. No special effort is taken to select a specific proportion of precocious males. Instead, a minimum size is chosen for selecting males for spawning. This size includes some jacks (generally 2% - 5% of the total number of males) based on length frequencies of coded wire tag returns. No backup males have been used, and the number of males returning to the hatchery has been large enough to prevent the need for reuse.

8.3) Fertilization

Fertilization is accomplished using a modified 6X6 factorial spawning protocol. This process involves all eggs are pooled into 24 females per bucket. The buckets of 24 females are divided into fours smaller buckets containing ~6 females worth of eggs. These eggs are washed and mixed in the water/sodium bicarbonate solution then drained. Each bucket is then divided into 6 lots approximating the volume of 1 female, where they are each fertilized by individual males. After 3-5 minutes these eggs are pooled back together then inventoried, prior to being water hardened in iodophore. All eggs are handled in accordance with the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State."

8.4) Cryopreserved gametes.

None used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

The mating strategy described will minimize the likelihood of significant loss of genetic diversity in the hatchery stock. Collection of spawners throughout the run minimizes inadvertent selection for a particular portion of the run. Random mating minimizes artificial selection of the brood stock.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

The station goal is to attain a survival of 85% from green egg to the eyed stage and a survival of 95% from the eyed stage to ponding.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

The average survival of coho eggs from the green to eyed stage for brood years 1992 – 1998 has been 90.0%. The average survival from the eyed stage to ponding for the same brood years has been 96.9%. A summary of annual survival rates during incubation is provided below.

Brood Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)
1992	1,202,000	92.5	99.1
1993	1,011,000	93.7	94.9
1994	2,871,000	96.0	94.2
1995	1,377,000	76.5	98.3
1996	1,928,000	90.3	97.5
1997	397,600	90.9	97.3
1998	320,000	94.8	96.9
1999	No Egg Take	N/A	N/A

2000	650,000	Eyed Eggs Transfer	93.2
2001	700,000	94.2	95.8
2002	650,000	94.7	97.1

9.1.2) Cause for, and disposition of surplus egg takes.

Eggs in excess of program needs are taken when available to safeguard against potential incubation losses. Culling of excess eggs, if necessary, is done randomly over the entire egg take to maintain run timing and maximize the potential number of family crosses. Surplus green eggs are sold to an egg buyer for edible row. The culling of eyed eggs is done by burying them on site in upland wooded area's.

9.1.3) Loading densities applied during incubation.

Eggs are incubated to the eyed stage in Sims troughs. Standard loading is approximately 84,000 eggs per cell or 840,000 eggs/trough. Approximately 12 gpm of water is supplied to each trough. After removal of nonviable eggs at the eyed stage, eggs are inventoried into 8-tray vertical incubators supplied with 4 gpm of water each. Each tray is loaded with approximately 6300 eggs and contains artificial vexar substrate.

9.1.4) Incubation conditions.

Water supply to the incubators in monitored four to five times per day. Influent dissolved oxygen levels are at saturation, and effluent dissolved oxygen levels are within acceptable parameters. Incubation water is generally supplied from four separate springs, but may also be supplemented with well water supply. Historically the spring water supplies average 51 degrees Fahrenheit, and only varies by 1 - 2 degrees year round. Well water supplies average 50 degrees Fahrenheit and vary by 1 degree year round. Beginning in brood year 2001 the water for the Sims troughs is chilled to 45degrees Fahrenheit . This is intended to produce a more normal timed hatch.

9.1.5) **Ponding**.

Coho are ponded into raceways directly from vertical incubators. Ponding is forced and takes place at between 1350 and 1450 accumulated temperature units depending on button up development. Ponding starts in February and continues as subsequent egg takes reach the proper stage of development.

9.1.6) Fish health maintenance and monitoring.

Eggs are treated daily with a fifteen-minute, 1:600 formalin drip for the first week then every other day thereafter while in the Sims troughs. Formalin treatments are discontinued once the eggs are transferred to vertical incubators, approximately seven to ten days prior to hatching. . Nonviable eggs are removed by machine and hand picking once they have reached the eyed stage. Eggs are disinfected in 100ppm of iodophor for ten-minutes prior to being transferred to vertical incubators.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Incubation of coho eggs for this program will have no adverse genetic or ecological effect on listed chinook stocks.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

Survival rates from ponding to release as yearlings for brood years 1991 – 1998 have averaged 91.6%. Survival rates by brood year follows:

Brood Year	Ponding to Release Survival (%)
1991	99.0
1992	85.3
1993	84.1
1994	98.0
1995	90.0
1996	91.6
1997	89.0
1998	96.0
1999	No releases
2000	95.0
2001	Fish still on site

9.2.2) Density and loading criteria (goals and actual levels).

Facilities and ponding procedures have been described in sections 5.5 and 9.1 above. Raceways are used for rearing for 4 - 5 months, until transfer to a large rearing pond for final rearing and release. Maximum density and loading indices in the raceways range from 0.13 – 0.16 lbs. of fish/cubic foot/inch of fish and 1.1 - 1.3 lbs. of fish/gpm/inch of fish at transfer. Maximum density and loading indices in the large rearing pond range from 0.11 – 0.13 lbs. of fish/cubic foot/inch of fish and 1.1 – 1.3 lbs. of fish/gpm/inch of fish at release.

9.2.3) Fish rearing conditions

This rearing site is supplied directly with spring and well water. The water temperature averages 51 degrees F and only varies by 1 degree year round. Influent dissolved levels (D.O.) are at saturation and range from 10.8 – 11.3 parts per million (ppm). The effluent D.O. levels from the large rearing pond at maximum loading range from 8.7 – 9.2 ppm. Effluent D.O. levels from all rearing vessels remain above 80% of the saturation level. Effluent temperatures and dissolved oxygen levels are within the limits required by the station's NPDES permit.

Ponds are cleaned regularly using a vacuum system that pumps the waste to pollution abatement ponds at each site. The frequency of cleaning is dependent on fish size, pond loading, and feeding levels, but generally is once per week in the raceways and twice per month in the large rearing pond.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

This station has a relatively warm and constant year round water temperature from its spring and well water supply, and coho can grow very rapidly if feeding rates are not carefully controlled. Because of this, care must be taken to begin controlling growth at a relatively small size so the coho population attains an acceptable release size for volitional release the next spring. Beginning with 2000 brood we are striving to achieve a more normal seasonal growth curve versus a flat line growth pattern. This is being done by reducing food early at 400 fpp. Feed is then increased for growth in early summer till fall when it will reduced again. In the winter we will have some starvation regime that is being developed in conjunction with the feed manufacturer. In early spring we will increase the feed to have a rapid growth prior to release. This is a new plan and is being done as a trial and data doesn't exist on it yet. This is a plan in progress and data will be gained in time.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available Data not available at this time given the relatively new feeding regime. Data will become available in the future.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

As mentioned above we are implementing a new feeding regime to try and have a more normal growth curve in warm constant temperature water. We have changed feed manufacture and feeding amounts to attempt to produce this more natural growth. Fish are reared on a commercial feed formulation produced by Moore-Clark. First feeding is done with Nutra plus and food is fed by hand up to 8 times daily based on the willingness of the fish to accept it. Food size, frequency, and rates are slightly less then the manufacturer's recommendations for fish size and water temperature, until fish reach approximately 400 fish per pound. At this point feeding is reduced to approximately 1/3 ration or 1% body weight and fish are fed only five times per week until early spring. At 150 fpp diet is change to Clarks fry and feed is delivered once a day with a blower mounted on a small truck. Feed rations are then increased to 2% body weight so the population can have some good growth through out the summer. Beginning in the fall feed rates will lower to a level that will dramatically lower the growth rate while maintaining healthy fish. This will be in the area of ¾ % body weight three days per week. In the winter we will have a starvation period that is being planned in conjunction with the feed manufacture's recommendations. This starvation period will end depending on fish size to allow for a strong growth period to achieve target release size of 19fpp in April.

Maximum feed rates in pounds of food fed per gallon per minute of inflow are generally 0.06 – 0.10. Feed conversion during the entire rearing period should averages 0.7 – 0.9 lbs. of feed fed/lb. of growth. This is based on facilities experience with these diets.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

The program goal is to maintain fish health through proper rearing densities and hygiene. Fish health is monitored on a monthly basis, by pathologists from the tribal fish health center. Disease treatments, if necessary, are conducted under the direction of these specialists based on their findings.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

No data of this nature is being gathered at this time.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Beginning with the 2000 brood year fish we have implemented some elements of "semi-natural" rearing. This includes the addition of floating structures such as camouflage hula-hoops and plastic lattice. This is the same type of material that we are using with an HSRG grant in one of our chinook ponds. We start this when the coho were ~400 fpp and continues until release. This is still in the development stage and we are working at perfecting these structures. In the short time period that we have been working with these new methods we have learned a lot about what is practical from the fish husbandry stand point. This is an interesting new aspects of fish culture and is already showing some behavioral differences in the fish.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Fish are reared to 1+age smolt size to mimic the natural fish emigration strategy and minimize the potential for adverse ecological effects.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

The vast majority of 1+-year-old smolt will be volitionally released with the last few fish forced out when the numbers are so low that they can no longer be fed.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	N/A	N/A	N/A	N/A
Unfed Fry	N/A	N/A	N/A	N/A
Fry	N/A	N/A	N/A	N/A
Fingerling	N/A	N/A	N/A	N/A
Yearling	630,000	19.0	4/1 – 4/30	Clear Creek

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Clear Creek (11.0013C)
Release point: Clear Creek RM 0.2 (Nisqually RM 6.3)
Major watershed: Nisqually River
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1991							305,800	18.7
1992					197,900	133.0	497,800	18.6
1993							407,400	17.5
1994							449,400	18.5
1995					21,500	110.8	600,000	17.9
1996	140,000	1400					660,000	16.4
1997			363,710	217.0			647,658	17.6
1998							638,000	17.5
1999	293,800	1400					517,000	18.6
2000							470,000	19.0
2001	N/A		N/A		N/A		No release	
2002							613,000	18.2
Average	216,900	1400	363710	217	109700	121.9	519305	18.03

10.4) Actual dates of release and description of release protocols.
Yearlings have been released from the first of April through early May. The release is volitional until the pond population is reduced to a level that feeding is impossible. Those fish, generally only a few thousand, are ultimately forced out. The most recent five-year release dates are provided below. All egg, fry and fingerling releases will be discontinued to reduce the potential competition with naturally produced fall Chinook.

Release Year	Fry/Fingerling Release Dates	Yearling Release Dates
1995	4/26	5/2 – 5/9
1996	1/3 (Eyed eggs)	5/1 – 5/3
1997	4/3 – 5/6	4/18 – 5/1
1998	NA	4/30 – 5/8
1999	1/28 – 2/19	4/1 – 4/29
2000	NA	4/1 – 4/18
2001	No releases	No releases
2002	NA	4/2 – 4/28

10.5) Fish transportation procedures, if applicable.
NA

10.6) Acclimation procedures.
NA

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.
The proportion of yearlings marked (Ad. Clipped and tagged) has ranged from 5.1% to 8.7% in the last five years. Yearlings have been marked and tagged to provide estimates of contribution and survival rates. No marks have been applied to eggs, fry, or fingerling releases. The proportion of hatchery releases marked and or tagged during the five previous release years is provided below.

Release Year	% of Fry / Fingerlings Marked/Tagged	% of Yearlings Marked/Tagged
1995	0	5.1
1996	N/A	7.7
1997	0	7.0
1998	N/A	6.8
1999	0	8.7
2000	0	10.6
2001	N/A	No releases
2002	N/A	5.6

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Proper inventory techniques particularly at the egg stage should prevent surplus occurring. Should this not be adequate, surplus fish would be killed or released in approved landlocked areas.

10.9) Fish health certification procedures applied pre-release.

Juvenile fish are examined monthly up to the time of release.

10.10) Emergency release procedures in response to flooding or water system failure.

Flooding levels are not predictable enough on the Nisqually River to foresee the need to release fish. In addition, at this facility, purposely releasing fish into a flooding river is probably not as effective as attempting to maintain the integrity of the ponds and water supply system, and allowing flood water to submerge the rearing ponds. Because of the multiple water supplies (five springs, three forebay intakes, and five production wells) at this facility, the risk of a water system failure is unlikely. In that event, however, only the minimum number of fish necessary would be released in order to protect the health of the remaining population.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Coho salmon are volitionally released as actively migrating yearling smolts from the first of April through the end of April in the lower 6.3 miles of the river. This measure should minimize the likelihood for interaction and adverse ecological effects to listed chinook juveniles. With the discontinuation of egg, fry and fingerling plants risks of negative interactions will be reduced.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Performance Indicator	Monitoring and evaluation
Treaty harvest in in-river fishery is on average between 15-20,000 adult Coho.	Fish Tickets
A average of 1,000 adults return to hatchery rack annually for brood stock	Count rack return.
Estimated escapement of natural spawners with a goal of 4000 adults	Spawning surveys estimates
The rate of fertilization and survival from egg to smolt provides for production goal of 630,000 yearling smolts	Hatchery records

Implement modified 6*6 factorial spawning protocol	Follow procedure in section 8.3 monitor fertilization rate
Brood stock collected through-out timing of migration to the rack, from mid September to early December	Hatchery records
Due to coho currently not being mass marked there is no way to identify Hatchery strays. It is our intention to begin mass marking with BY 2002.	Implement coho mass marking in 2003 sample returning jacks and adults
Hatchery smolt size is maintained at minimum of 19 per pound to maximize probability of immediate out migration	Hatchery records
Hatchery smolts released below RM 6.3 to minimize interaction with natural out migrating smolts	Hatchery location

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding for monitoring and evaluation are expected to be available.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

No adverse genetic or ecological effects to Nisqually fall chinook will result from monitoring or evaluation activities.

SECTION 12. RESEARCH

12.1) Objective or purpose.

In 2002 the Tribe began conducted a pilot study to determine juvenal salmonids utilization in the lower river and in the estuary. The objective is to determine potential co-occurrence (predation and competition), timing, size, diet, number estimates, and habitat types used.

12.2) Cooperating and funding agencies.

Hatchery reform funds from NWIFC were used for this pilot study in 2002 and they were successful at receiving additional funding for 2003.

12.3) Principle investigator or project supervisor and staff.

Sayre Hodgson – Nisqually Tribe Research Biologist

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Same stock as listed in section 2

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.
Sample site were chosen to represent various habitat types and spatial area's. Samples were taken with fyke nets and beach seines bi-weekly. Samples were identified and enumerated by species and sub-samples were measured for length. Sub-samples are taken for stomach content. Clove oil is being used as anesthetic.

12.6) Dates or time period in which research activity occurs.
April 1 to August 29 2002, (Planned) February 28 to August 31 2003

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.
Samples are carefully and rapidly processed. Holding duration is held to a minimum usually less then ten minutes in buckets. Anesthetized fish are put into a recovery bucket.

12.8) Expected type and effects of take and potential for injury or mortality.
2002 results– 1,966 chinook sampled 1,683 were hatchery marked. 22 lethal samples 18 were marked hatchery fish. 28 incidental mortality 24 of which were marked hatchery fish. 4 incidental mortality were also used as lethal samples. Total known take of Chinook was 46 chinook 28 of which were marked hatchery fish, 18 were un-marked chinook

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table).
Take is for research and has been accounted for under the NWIFC research section of the 4d exemption.

12.10) Alternative methods to achieve project objectives.
This research is believed to be the best way possible to achieve the information desired.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
Results from 2002 Estuary study:
109 Coho sampled, 39 Cutthroat sampled, 1,174 Chum sampled
Incidental mortality of 10 Chum and the 18 un-marked chinook(see section 12.8)

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
Steps to minimize adverse effects of sampling study include: quickly and gently removing fish from nets, not fully removing cod-end of the beach seine from the water, and monitoring very closely the condition of the fish after capture, the water temperature in which they are being held, and that they are fully resuscitated from the anesthetic prior to release.

SECTION 13. ATTACHMENTS AND CITATIONS

CRAS Coded Wire Tag Retrieval and Analysis System
Nisqually coho CWT Summary Reports Brood Years 1991 – 96
Nisqually coho CWT Recovery Distribution Reports Brood Years 1991 – 96
Nisqually coho freshwater Recovery Reports Brood Years 1991 - 96
Northwest Indian Fisheries Commission Release Records Brood Years 1989 – 2000
Nisqually Fall Chinook recovery Plan.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Fall Chinook	**ESU/Population: Puget Sound/Nisqually River**		**Activity: See below**	
Location of hatchery activity: Nisqually River	**Dates of activity:____________________**		**Hatchery program operator: Nisqually Tribe**	
Type of Take	**Annual Take of Listed Fish By Life Stage *(<u>Number of Fish</u>)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

<u>Instructions</u>:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
1. Each take to be entered in the table should be in one take category only (
2. There should not be more than one entry for the same sampling event).
4. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.